tude 152° 30′ [west ?]. The heavy pack formation of the young ice caused the expedition to seek winter quarters in Victoria Land. The ship was frozen in March 24, 1902. The expedition passed a comfortable winter in well-sheltered quarters. The lowest recorded temperature was 62° F. below zero. Sledging commenced September 2, 1902; parties being sent out in all directions. That under the command of the chief of expedition traveled 94 miles to the south, reaching land in latitude 80° 18′ south, longitude 163° west, establishing a world's record for the farthest point south. The party found that ranges of high mountains continue through Victoria Land. At the meridian of 160° west, foot hills much resembling the Admiralty Range were discovered. The ice barrier is presumably afloat. It continues horizontal and is slowly fed from the land ice. Mountains ten or twelve thousand feet high were seen in latitude 82° south, the coast line continued beyond, at least as far as 83° 20′, nearly due south.

NOTE ON THE BAROMETRIC PRESSURE AT COLON.

By General HENRY L. ABBOT, dated May 30, 1903.

The data for August, September, and October, 1902, at Colon, referred to in the MONTHLY WEATHER REVIEW, March, 1903, p. 143, having been communicated to me in all their details, I am now able to complete the study of the mean barometric pressure at this place at sea level.

Hour.	Millimeter.	Hour.	Millimeter.
1 a. m.	757.99	2 p. m.	757.24
2 a. m.	757.70	3 p. m.	756.76
3 a. m.	757.40	4 p. m.	756.63
4 a. m.	757.34	5 p. m.	756.71
5 a. m.	757.44	6 p. m.	756.91
6 a. m.	757.65	7 p. m.	757.25
7 a. m.	758.02	8 p. m.	757.64
8 a. m.	758.57	9 p. m.	758.05
9 a. m.	758.96	10 p. m.	758.28
10 a. m.	759.06	11 p. m.	758.40
11 a. m.	758.83	Midnight	758.33
Noon	758.41		
1 p. m.	757.74	Mean for the 24 hours.	757.80

First, as to reduction to sea level. Using Guyot's Tables I adopt for Colon (25 feet elevation) a correction of + 0.026 inch. I am informed that "+ 0.02 inch was used for several weeks until + 0.03 was authorized and this is now used." So there is no sensible difference in our methods of reduction. For Alhajuela I adopted (height 43.7 meters or 143 feet) a correction ranging from + 3.74 to 3.78 millimeters according to the corresponding air temperature, say + 0.147 to + 0.149 inch. This, by comparison with the above Weather Bureau figure at Colon, seems to be in good accord. From a note that I wrote at Paris, in 1900, giving, in French units, the full hourly record for eight months in 1898 and 1899 at Colon, I quote the preceding hourly means.

This indicates a correction, to reduce an 8 a. m. reading to the mean for twenty-four hours, of —0.77 millimeter. Referring to each of the eight months I find the differences to be: October, — 0.8; November, — 0.8; December, — 0.8; January, — 0.8; February, — 0.6; March, — 0.8; April, — 0.8; May, — 0.9; mean of the eight months, — 0.79.

Unfortunately October is the only month common to the two series of these Weather Bureau records for 1898 and 1903, but in view of the above uniformity of the value of the reduction from 8 a. m., observations to the mean of the twenty-four hours, I think we may safely adopt a value at Colon of — 0.80 millimeters. Hence, the computation by the Editor on page 143, becomes as given in the following table, in millimeters for sea level:

Year, 1902.		August.	September.	October.
Weather Bureau barometer	Mean, 8 a. m.	757.56	758.18	758.73
	Correction	—0.80	—0.80	—0.80
	Mean, 24 hours	756.76	757.38	757.93
Panama Company's barograph.	Readings	762.51	762.88	763.64
	Corrections	—5.75	—5.50	—5.71

This computation gives a mean correction of —5.65 millimeters for the barograph. By using the Alhajuela horary curve the Editor found the correction to be —6.00, while my comparison with the records on the northern shore of South America gave —3.90 millimeters. These three values for the correction, converted to inches, become: —0.022, —0.024, and —0.015, with a largest discrepancy of 0.0083. I shall adopt —5.65 millimeters as probably the better value, and the small discrepancies obtained by such different methods make me believe it to be quite satisfactory. The mean reading at sea level at Alhajuela is then 757.86 millimeters, or 29.840 inches. The mean reading of the hourly series made by the Weather Bureau at Colon for eight months in 1898–99 was 29.866 inches.

NOTES AND EXTRACTS.

CLIMATIC FACTORS IN RAILROAD ENGINEERING.

A thesis on the above subject has been prepared by R. M. Brown as a part of his course in general climatology at Harvard University and has been published in the Journal of Geography for April, 1903. The struggle of railroads against climatic conditions has been recorded so fully during the past century as to become exceedingly instructive and the influence of the various climatic factors is presented one by one in Mr. Brown's memoir.

As to heavy precipitation he notes that the rainy seasons are often followed by droughts and this alternation destroys all woodwork either by shrinkage and splintering or by the growth of fungi. Railroad ties decay when there is a good supply of moisture and when the temperature is between 32° and 150°. Data on these points are given for India, South Africa, Central Africa, and Central America.

The diseases that are considered peculiar to climate, such as cholera, malarial fevers, and yellow fever offer difficulties that must be overcome. The experiences of numerous large railroad undertakings are mentioned. The droughts that occur in some locations require the building of huge tanks while in other cases one must go a long distance to obtain pure water. Outdoor work can not well be done in the rainy weather and laborers accustomed to hot dry weather lose many days in the rainy season.

The floods and damages by heavy rains are matters of great importance and "are registered on the books of the construction companies with unceasing regularity. * * * The history of every road that traverses the belt of heavy precipitation is a story of continual struggle against floods." In regions of heavy rainfall land slips are frequent and a long list of these is given by the author.

The ballast on the roadbed appropriate to the long, dry season is not appropriate to the heavy-rain season. In general, the ballast produces dust haze sufficient to obscure the approaching train, the dust also penetrates the machinery, causing hot axles and other damage. In America and England under most conditions, stone ballast is the more expensive but in India the climate reverses this rule.

In regions of moderate precipitation whether of rain or snow, the length and weight of the freight trains is determined by the weather; thus, on the Pennsylvania Railroad west of Pittsburg, the load assigned to an engine is 1750 tons in good weather and 1225 in bad weather. On the Union Pacific road the snow offers great obstacles, about 2 per cent of the entire expense of the road is credited to the removal of snow and repairs of snow sheds. The Iquique Railroad of Chili reports increased cost of working during fogs which produce slippery rails.

In regions of light precipitation, or drought, railroad ties

decompose; the danger of fire is increased, the burning bridges cause wrecks of trains. In the Arabian deserts the railroad operators suffer comparatively little from disease. On the Transcaspian road the lack of good water brought about disease. On the Iquique road it is necessary to convey water in tanks and in some cases distilled water was carried 40 miles on mules.

In regions of high altitude the rarefaction of the air causes much trouble to the operators, but on the other hand the absence of germs prevents the decay of organic matter. In the report of work on the railroad up the Jungfrau, Dr. Kronecker stated that mountain sickness sets in at altitudes varying with different persons, but that it attacks all persons as soon as they indulge in the least muscular effort above 10,000 feet. Persons in good health can stand being passively transported up to 12,000 feet without inconvenience; a prolonged sojourn may, however, be disastrous. On the Callao, Lima, and Oroya Railroad many thousands of laborers lost their lives. "So difficult was it to work in the rarefied air at high altitudes that riveters did not average a week's work each and many returned on the next train." On the other hand, in building the Sierra Leone Railroad the number of deaths and invalids was wonderfully low, but the climate had an enervating effect and there were frequent absences on leave. In the upper portions of the railroads, such as the Jungfrau, snow avalanches are a serious obstacle but may be avoided by burrowing under or by underground tunnels. Many railroads are abandoned during the snow season. Not only in Switzerland but also in the Rocky Mountain region snow sometimes overpowers all human efforts.

In regions of severe winter cold another class of obstacles is met with, namely, the formation of ice. Although deep and frozen rivers and lakes may be traversed by railroads, yet when the breakup comes in springtime there is a period when such transportation must cease and when boats also are impossible. The experiences of the Transsiberian road and the Canadian Pacific are given with some detail. The average number of days during which work is possible on account of the snow and ice and the frozen ground is very limited. At Lake Baikal the soil is unworkable from October to April; at Vladivostock, the number of days when the temperature is below freezing is 150, and, in general, on the Transsiberian railroad the total number of working days in a year is about 100. A general tabulation of the number of working days in each month of the year, for various portions of the United States, would perhaps elucidate many of the problems relating to the labor question.

METEOROLOGICAL EXPEDITION TO THE BAHAMAS.

The Geographical Society of Baltimore, which has been organized and developed through the efforts of Dr. George B. Shattuck and of which Dr. Daniel C. Gilman is President, has organized an expedition for a scientific survey of the Bahama Islands. This expedition will sail on Monday, June 1, from Baltimore for Nassau and other points in the Bahamas. There are about twenty-five scientific members of the party. The vessel, *William H. Van Name*, a schooner of 97 tons, 100 feet long, 26 feet wide, and 9 feet draught, has been chartered, with a special crew, under Capt. C. D. Flowers. The general expenses of the expedition, amounting to about $6000, have been defrayed by contributions from the Geographical Society of Baltimore, the Johns Hopkins University, the Coast and Geodetic Survey, and, especially, the Governor of the Bahamas, Sir Gilbert T. Carter, who will accompany the expedition. A great variety of scientific work is provided for, such as the culture of bacteria, the study of mosquitos and malaria, the observation of marine life at great depths through panes of plate glass inserted in the bottom of a dory. A monument will be established as a bench mark, to which the mean sea level can be referred, and any change in the altitude of this monument above mean sea level will indicate the rising and falling of the earth's crust. A self-registering tide gage will be established at Nassau and be maintained for at least a year by the United States Coast and Geodetic Survey. The Department of Agriculture has allowed the following officials to accompany the expedition, namely, Dr. Oliver L. Fassig, Section Director, United States Weather Bureau, in charge of observations on climatology and physics, and Messrs. C. M. Mooney, J. C. Britton, and E. C. Hughes, who will conduct a soil survey. The National Museum will send Mr. Barton Bean, curator of fishes, who will conduct the work in marine zoology. Dr. Fassig carries several kites for special aerial exploration and will also conduct magnetic observations; he will be assisted by Mr. J. E. Routh. Geology, botany, medicine, and other branches of science are represented by the other members of the party.

Such expeditions as these for geographic exploration and scientific observation give an immense stimulus to the progress of science. Every university profits by encouraging such work. The earth, its atmosphere, and its inhabitants can be properly studied only in proportion as we travel and learn to take a comprehensive view of the whole globe.

MISCELLANEOUS ITEMS.

The Sierra Club of San Francisco has organized an excursion to the summit of Mount Whitney. Prof. Alexander G. McAdie, of the United States Weather Bureau; Prof. Gifford Pinchot, of the Bureau of Forestry, and Dr. G. K. Gilbert, of the United States Geological Survey, will accompany it. It is hoped that Professor McAdie will be able to establish maximum and minimum thermometers on the summit, so that a year hence we may have a record of the extremes of temperatures that have occurred there.

Mr. A. F. Osler, the inventor of the self-recording pressure-plate anemometer, established at many stations in England, died on April 26, near Birmingham, England, at the advanced age of 95. He was a Fellow of the Royal Society of London (1855) and one of the founders of the Royal Meteorological Society (1851).

An international kite competition will be held on the Sussex Downs on June 25.

The Berlin Society for the study of the globe (Gesellschaft für Erdkunde) will celebrate its 75th aniversary on May 4. This society has greatly furthered the progress of meteorology.

When Captain Colbeck discovered the position of the *Discovery*, his own vessel, the *Morning*, was eight miles distant, and a floe of ice prevented any nearer approach. Therefore, coal and provisions were transferred by means of sledges. The *Discovery* is only provisioned until January, 1904, so that a second relief expedition will be necessary.

The *Fram*, under the command of Captain Sverdrup, reached Norway on September 12, 1902, after an absence of four and a quarter years, during most of which time she was locked up in the great Arctic ice fields. The most northerly point attained was 81° 40′ north, in latitude 94° west, and Captain Sverdrup thinks it unlikely that land will be discovered in that region. Meteorological observations were taken every second hour during the four years.